Strengthening STEM Pathways Through Astronomy Outreach: Insights from Zambia's Community-Based Engagement Initiatives

African Astronomical Society (AFAS) Conference

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How did we Strengthen STEM Pathways Through Astronomy Outreach:

1. By promoting interest in astronomy among Zambian students (Night Sky Observation)
2. Commemorating World Space Activities (Space Week, World Asteroid Day, etc.)
3. By providing hands-on learning experiences (Outreach Conferences and Workshops)
4. Encouraging creativity through science-based activities (TART installation Workshop)
5. Increasing public awareness of astronomy in Zambia (Public Lectures)
6. Inspiring STEM interest through astronomy education (Astronomy Practical)
7. Building partnerships with schools and communities
8. Strengthen collaboration between CBU and other institutions within Zambia and Beyond.

STEM Outreach Activities

STEM Activities 1: Night Sky Observations

Using Astronomy as a Driver of Sustainable Tourism and Local Economies

Aim: *"Transforming the night sky into a catalyst for local development."*

- Community empowerment with local communities as hosts
- STEM awareness via stargazing activities
- Cultural astronomy preservation
- Promote dark-sky preservation policies
- Connect indigenous astronomical knowledge with modern science
- Create income-generating opportunities in rural communities

Future Direction

- Mobile Planetarium
- Community Stargazing Events

STEM Activities 2: World Space Week 2025

Theme: Living in Space: A Celebration of Human Space Exploration

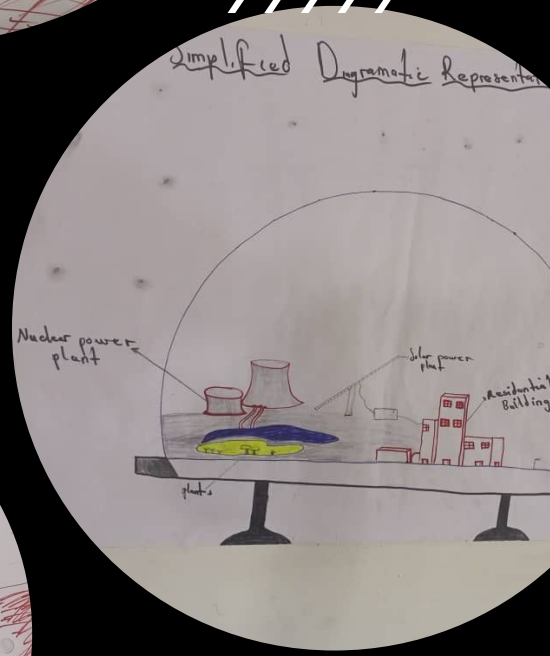
🌍 Theme: "Living in Space" | Oct 6, 2025

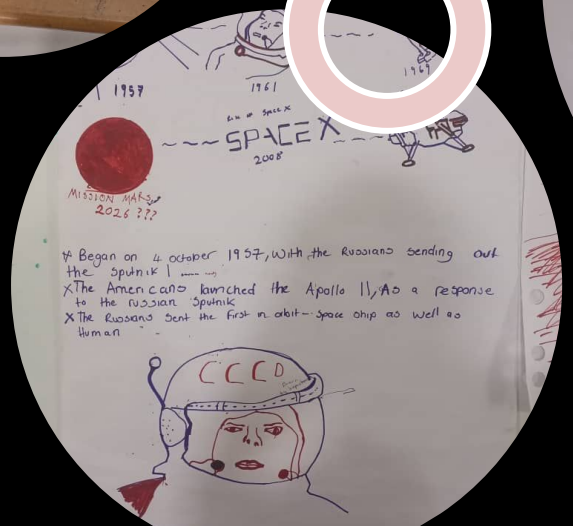
- *The event brought together secondary school students from **Grades 10–12** for an exciting lineup of **science presentations**, **exhibitions,** and **debate competitions**.*

- *Participants explored ideas around:*
  - *Human adaptation and survival beyond Earth*
  - *Combining scientific inquiry with creative expression*

- *Cash prizes were awarded*
- *Certificates were also offered to students and teachers*

Gallery 2a: Living in space design templates: A collaborative strategy that encouraged peer learning and teamwork.





Gallery 2b:

Quiz Competition and debate on “Viability of Living in Space”:

Winners of the Quiz Competition, the debate competition, and certificate collection

STEM Activities 3: Trident College, Solwezi, Zambia

Astronomy Outreach Conference — Hands-on Learning

AIM: *Promote interest in astronomy among Zambian students*

Day1: Evening:

- Evening Lecture with Stellarium, Celestia, and Other Astronomy Outreach softwares
- Stargazing in the Open Fields

Day 2: Morning Session:

- Lectures on Selected Astronomy topics
  - Galaxies
  - Solar System
  - Black holes
  - Careers in Astronomy

Day 2: Afternoon Session:

- Solar Photosphere viewing with Eclipse Shades
- Galileoscope Assembling

Gallery 3

Gallery 3a: Day 1 Evening Session at Trident College

Gallery 3b: Day 2 Morning and Afternoon Session at Trident College

STEM Activities 4: Twatasha Secondary School, Zambia

Astronomy for Mental Health and and Empowering the the Girl Child

AIM: Promote interest in astronomy among Zambian Female Students

Key Events:

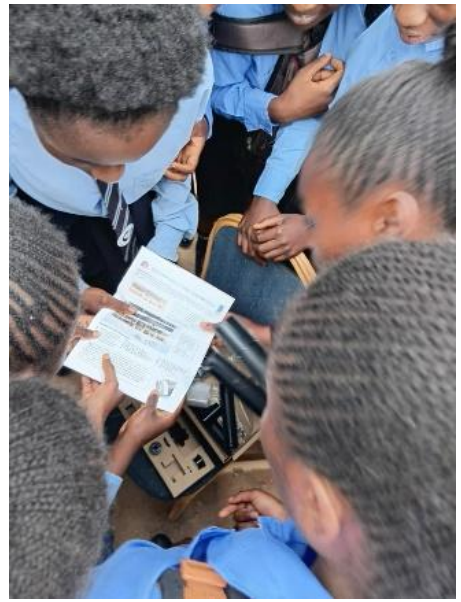
- Lectures on Astronomy as a tool for mental Development
- Careers in Astronomy
- Stellarium, Celestia, and Other Astronomy Outreach software
- Star Gazing in the Open Fields

Day 2: Afternoon Session:

- Solar Photosphere viewing with Eclipse Shades
- Galileoscope Assembling

Gallery 4

Gallery 4: Twatasha Girls Secondary School Outreach activities, including lectures, observation sessions, and the assembly of Galileoscopes, etc.



STEM Activities 5: TART Installation Workshop

The Transient Array Radio Telescope (TART)

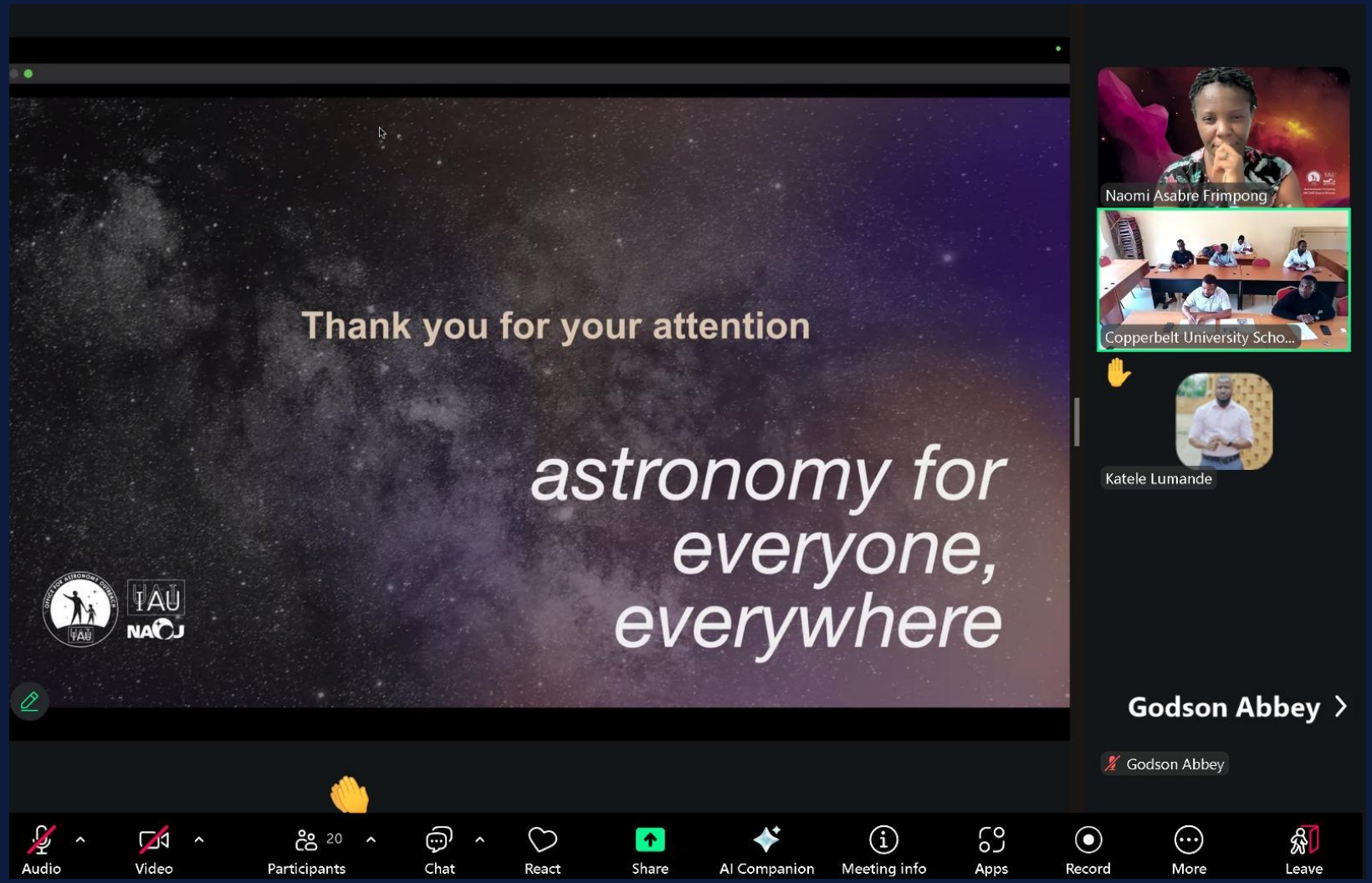
- Open-source,
- low-cost, 24-element aperture synthesis radio telescope
- Operating at 1.57542 GHz band
-
- **Designed for:**
  - Education
  - Research
  - Tracking transient cosmic events.
-
- **Developed by**:
  - University of Otago in Partnership and DARA

Gallery 5: TART Workshop and Installation at Copperbelt University Zambia

STEM Activity 6a: Public Lectures and Talk Physical

Group Photos after Prof James Lecture on “Astronomy and Astrophysics as key drivers of institutional and National development in Zambia” with the Vice Chancellor of Copperbelt University, Prof Imasiku Nyambe, to commemorate the Installation of the Copperbelt University High-Computing Server

STEM Activity 6b: Public Lectures and Talk Virtual



Naomi Asabre Frimpong is the Deputy Director of the International Astronomical Union's Office for Astronomy Outreach (IAU OAO), hosted at the National Astronomical Observatory of Japan (NAOJ). She holds a PhD in Astrochemistry from the University of Manchester. Currently, she leads a global coordination of astronomy communication and education through the IAU's network of over 130 National Outreach Coordinators (NOCs).

Her work spans international initiatives such as *100 Hours of Astronomy 2025*—celebrating *100 Years of the Planetarium*—and the *Women in Solar Physics* live webinar series. She also serves as Editor of the *Astronomy in Action* newsletter, Co-Managing Editor of *CAPjournal*, and Board Member of the African Network of Women in Astronomy (AfNWA).

Previously, she was Vice President of the African Astronomical Society (AfAS) and Head of Science Communication and Outreach at the Ghana Space Science and Technology Institute (GSSTI). Her expertise spans leadership, science communication, strategic planning, and international collaboration, with a focus on connecting science, sustainability, and society through inclusive and inspiring astronomy outreach.

Strategies for Expanding STEM

Curriculum Enhancement

- Development of a standardized astronomy curriculum suitable for various educational levels
- **Astronomy Practical handbook:** Sunspot, Positional Astronomy, virtual labs sessions, Night sky Observations, etc.
- **Astronomy and Astrophysics Major:** September 2026 intake
- B.Sc Astrophysics
- M.Sc Astrophysics
- Ph.D Astrophysics

Partnership Expansion

Extend partnerships with more institutions and organizations to broaden the program's reach.

Technological Integration

Incorporate advanced technology to offer more interactive and immersive learning experiences.

Resource Allocation

Secure funding and resources to ensure the sustainability and expansion of outreach activities

Impact & Achievements

🔭 Hands-on Learning

Telescope assembly, Galileoscopes, Stellarium and Celestia simulations gave students deep practical exposure to astronomy

🌟 Inspiration & Curiosity

Students encouraged to see themselves as future scientists, engineers, and innovators in the global knowledge economy

📚 Scientific Literacy

Teachers and students gained practical exposure to astronomy concepts often absent from conventional curricula

🤝 Networking & Mentorship

Collaboration between CBU, Fast4Future, and SAROAD fostered connections between academia and student communities

🏆 TART Telescope

Successful installation and commissioning of the Transient Array Radio Telescope at CBU — a milestone for Zambian radio astronomy (Four UG Students)

👧 Girl Child Empowerment

Astronomy for Mental Health program specifically targeted girls at Twatasha Secondary School, promoting STEM inclusion

Challenges Encountered

- **Limited access to equipment**
  - Access to outreach materials: Solarscopes, Galileoscopes, Planispheres, Posters, Stickers, etc.
  - Mobility issues: Some communities are difficult to reach

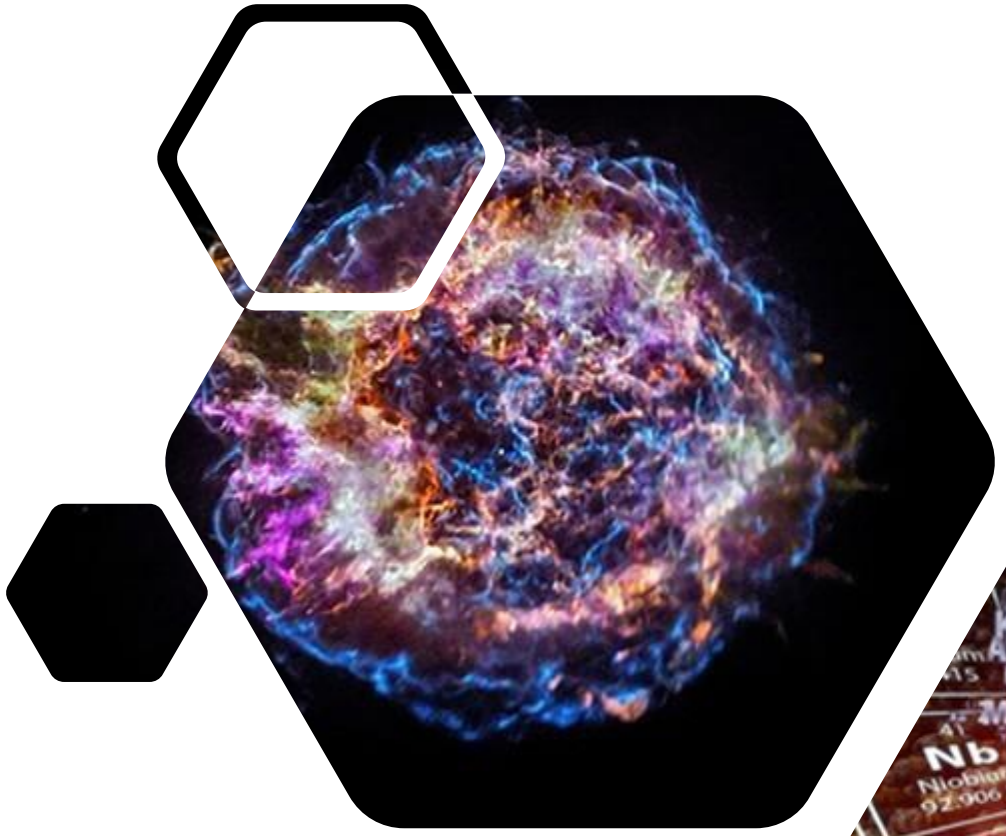
- **Need for sustained funding and Mentorship**
  - Retrain the Trainer: Keep redoing these trainings and other outreach activities for teachers and students

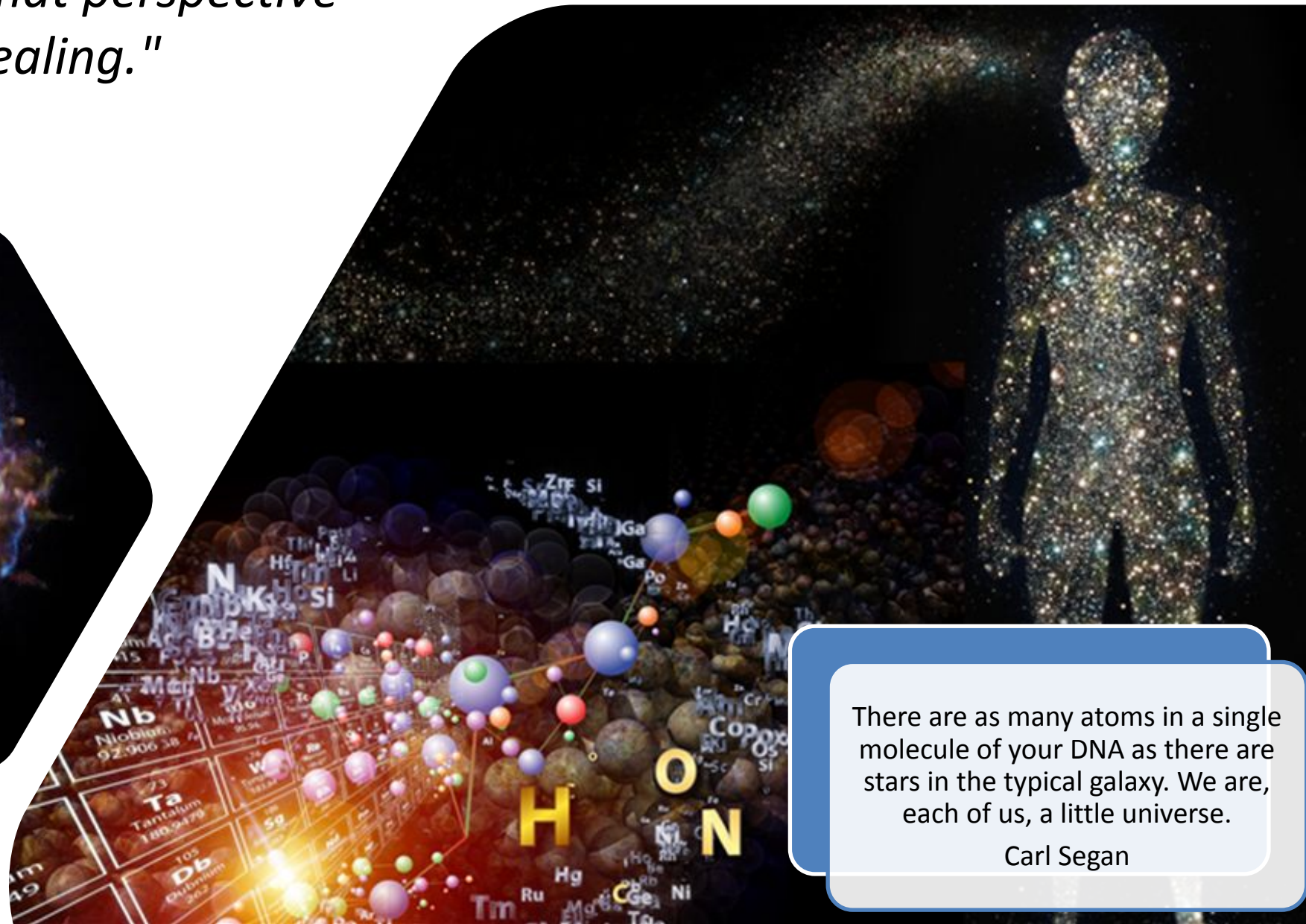
- **Collaborations**
  - Establishing MOAs with other neighbouring Schools and Universities for exchange opportunities, partnerships, and training.

Conclusion

- *Astronomy outreach can transform STEM education*
- *Astronomy inspires future African scientists*
- *Astronomy supports education, empowerment, and sustainable development*

"Astronomy reminds us that we are part of something vast — and that perspective can be deeply healing."





Acknowledgement

Thank You